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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,110	03/02/2004	Timothy Chipman	021404.0007US1	2451

34284 7590 01/07/2009

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EXAMINER	
KANG, INSUN	

ART UNIT	PAPER NUMBER
2193	

MAIL DATE	DELIVERY MODE
01/07/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/791,110	CHIPMAN, TIMOTHY	
	Examiner	Art Unit	
	INSUN KANG	2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 October 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24 and 31-34* is/are pending in the application.

4a) Of the above claim(s) *25-30 and 35-48* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24 and 31-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-24 and 31-34 have been examined.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 – 14 and 31 - 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Advanced Compiler Design & Implementation, Steven S. **Muchnick**, August 19, 1997 in view of Tip et al. (US 7,003,507) hereafter Tip.

Claim 1

Munchnick teaches a method for analyzing a program, comprising: determining a set of functions required by the program by performing local type constraint analysis at intermediate language instruction level (Munchnick, page 609-618, CFG).

Munchinick does not explicitly teach that the analysis is performed to determine which functions have the potential of being executed and determining a call path that may reach a function containing such instructions. However, Tip teaches it was known in the pertinent art, at the time applicant's invention was made, to determine the reachability of local methods so that unreachable methods can be removed (i.e. col. 1 lines 40-53). It would have been obvious for one having ordinary skill in the art to modify Munchnick's disclosed system to incorporate the

teachings of Tip. The modification would be obvious because one having ordinary skill in the art would be motivated to determine the reachable methods for execution.

Claim 2

Tip further discloses analyzing a program instruction that accesses an object field, wherein the analysis is performed locally to an object instantiation. (i.e. col. 3 lines 1-10).

Claim 3

Tip further discloses analyzing a program instruction that accesses an array element locally to an array instantiation. (i.e. col. 9 lines 42-50).

Claim 4

The method of Claim 1 further comprising: analyzing a program instruction that accesses runtime information for a local runtime symbol usage. It is inherent for programs to access the symbol table during runtime.

Claim 5

The method of Claim 1 further comprising: analyzing a program instruction within an exception handler performed locally to an exception instruction. (Muchnick, pages 43-44, exception handler names are part of the symbol table).

Claim 6

The method of Claim 1 further comprising: declaring possible return types of native functions, where a type analysis of intermediate language instruction is not possible (Muchnick, pages 612).

Claim 7

The method of Claim 6, wherein the set of functions may be in a single program image.

Official Notice is taken that an single image is the minimum. And a small program will produce at least one image.

Claim 8

A computer-readable medium storing computer-executable process steps of a process for analyzing a program, comprising: determining a set of functions required by the program by performing local type constraint analysis at intermediate language instruction level and a call path that may reach a function containing such instruction.

See the rejection for claim 1.

Claim 9

The computer readable medium of Claim 8, further comprising: analyzing a program instruction that accesses an object field, wherein the analysis is performed locally to an object instantiation.

See the rejection for claim 2.

Claim 10

The computer readable medium of Claim 8, further comprising: analyzing a program instruction that accesses an array element locally to an array instantiation.

See the rejection for claim 3.

Claim 11

The computer readable medium of Claim 8, further comprising: analyzing a program instruction that accesses runtime information for a local runtime symbol usage.

See the rejection for claim 4.

Claim 12

The computer readable medium of Claim 8, further comprising: analyzing a program instruction within an exception handler performed locally to an exception instruction.

See the rejection for claim 5.

Claim 13

The computer readable medium of Claim 8, further comprising: declaring possible return types of native functions, where a type analysis of intermediate language instruction is not possible.

See the rejection for claim 6.

Claim 14

The computer readable medium of Claim 13, wherein the set of functions may be in a single program image. See the rejection for claim 7.

Claim 31

Munchinick does not explicitly teach that the program runs in a managed runtime environment. However, Tip teaches such a managed runtime environment was known in the pertinent art, at the time applicant's invention was made, to provide a dynamic runtime environment that abstracts away the specifics of the operating system and the architecture running beneath them (i.e. JVM, col. 8 lines 45-50). It would have been obvious for one having ordinary skill in the art to modify Munchnick's disclosed system to incorporate the teachings of Tip. The modification would be obvious because one having ordinary skill in the art would be motivated to provide an abstract runtime environment.

Claim 32

The computer readable medium of Claim 8, wherein the program runs in a managed runtime environment. See the rejection for claim 31.

4. Claims 15 – 24, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fast Static Analysis of C++ Virtual Function Calls, David F. Bacon et al, ACM, 1996, pages 324 – 341 view of Tip et al. (US 7,003,507) hereafter Tip.

Claim 15

Bacon anticipates a method for analyzing a program, comprising: determining an object type that may exist at an execution point of the program, wherein this enables determination of a possible virtual function that may be called. (Bacon, page 324 – Introduction and Overview and page 329 Tables results of analysis)

Bacon does not explicitly teach evaluating all possible object types that are created at every instruction of a program and carrying the object types through a stack evaluation. However, Tip teaches it was known in the pertinent art, at the time applicant's invention was made, to evaluate all possible object types and the reachability of local methods so that unreachable methods can be removed (i.e. col. 1 lines 40-53). It would have been obvious for one having ordinary skill in the art to modify Bacon's disclosed system to incorporate the teachings of Tip. The modification would be obvious because one having ordinary skill in the art would be motivated to determine the object types and reachable methods for execution.

Claim 16

The method of Claim 15, further comprising: creating a call graph at a main entry point of the program; and recording an outgoing function call within a main function. (Bacon, and page 329 Tables results of analysis – Call Sites).

Claim 17

The method of Claim 16, further comprising: analyzing possible object types that may occur at any given instruction from any call path for a virtual call. (Bacon, page 338, section 4.2 – Alias).

Claim 18

The method of Claim 17, wherein possible object types are determined by tracking object types as they pass through plural constructs. (Bacon, page 325, upper left).

Claim 19

The method of Claim 15, further comprising: calling into function generically for handling specialized native runtime type information. (Bacon, page 333, bottom right of page)

Claim 20

A computer-readable medium storing computer-executable process steps of a process for analyzing a program, comprising: determining an object type that may exist at an execution point of the program, wherein this enables determination of possible virtual functions that may be called. See the rejection for claim 15.

Claim 21

The computer readable medium of Claim 20, further comprising: creating a call graph at a main entry point of the program; and recording an outgoing function call within a main function. See the rejection for claim 16.

Claim 22

The computer readable medium of Claim 21 further comprising: analyzing possible object types that may occur at any given instruction from a call path for virtual calls.

See the rejection for claim 17.

Claim 23

The computer readable medium of Claim 22, wherein possible object types are determined by tracking object types as they pass through plural constructs.

See the rejection for claim 18.

Claim 24

The computer readable medium of Claim 20, further comprising: calling into functions generically for handling specialized native runtime type information.

See the rejection for claim 19.

Claim 33

The method of Claim 15, wherein the program runs in a managed runtime environment.

Bacon, page 324, Introduction, Runtime. Tip, JVM, col. 8 lines 45-50.

Claim 34

The computer readable medium of Claim 20, wherein the program is in a managed runtime environment. See the rejection for claim 33.

Response to Amendment

5. Claims 31-34 were grouped in Group II by mistake in the restriction notice. The claims depend on claims 1, 8, 15, and 20 respectively; therefore, the claims have been considered and

further examined. The applicant is requested to correct the status identifier for these claims in the next communication.

Response to Arguments

6. Applicant's arguments with respect to claims 1-24 and 31-34 have been considered but are moot in view of the new ground(s) of rejection. Therefore, this action is non-final.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to INSUN KANG whose telephone number is (571)272-3724. The examiner can normally be reached on M-R 7:30-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lewis A. Bullock, Jr. can be reached on 571-272-3759. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Insun Kang/
Examiner, Art Unit 2193